MINOLTA HI-MATIC AF2-M

Similar models: AF2 (description of AF principle covered in Sep-Oct 1983 SPT Journal)

Batteries: 2ea AA-size (negative ground)

Fig. 1— top view, covers removed

Fig. 2— bottom view, covers removed

Fig. 3— back view, covers removed

Fig. 4— front view, covers removed

Fig. 5— side view, lens assembly

Fig. 6— front view, shutter block removed

Fig. 7— shutter block, back view

Fig. 8— top view, shutter block and AF module removed

Fig. 9— lens assembly, front view with film-speed ring removed

Fig. 10— lens assembly, front view with front ring removed

Fig. 11— flash-circuit board, front view

Fig. 12— IC 101, pin voltages

Fig. 13— AF-module connector, pin voltages

Fig. 14— wiring pictorial

ADJUSTMENT LOCATIONS:

Parallax (vertical)	A*
AF accuracy	B*
Exposure (trigger switch)	C
Focus (infinity)	D

*Adjustments on the AF module should not be necessary. If you replace the AF module, the adjustments are factory-set.

ADJUSTMENT PROCEDURES, AUTOFOCUS:

1. For parallax and infinity adjustments, it's necessary to hold open the shutter. To hold open the shutter, proceed as follows:
   a. Place a piece of black tape over the CdS.
   b. Remove the self-timer lever and the serial-number plate (bottom of camera).
   c. Connect a test lead to the end of R109 (the resistor, Fig. 7, is visible through the slot at the bottom of the camera after removing the serial-number plate). Connect a 1M resistor to the other end of the test lead as indicated in Fig. 2.
   d. Release the shutter. While the shutter is open, connect the other end of the 1M resistor to ground (the self-timer shaft). The shutter stays open as long as the test lead remains connected to R109 and ground.
2. Check horizontal and vertical parallax by using a 34" x 22½" test target. Position the camera 1m from the target. Release and hold open the shutter. View the target with a ground glass at the focal plane. Shift the camera until the target corners are within the focal-plane aperture. Then view the target through the finder; the target corners should be within the frame-line corners. Adjust by shifting the viewfinder mask. Adjustment A, Fig. 1, shifts the frame lines vertically. The horizontal-shift adjustment is under the circuit board at the top of the AF module (directly behind the vertical adjustment).
3. Check the selectivity by using a bar target ¼" wide. Remove the filter ring at the front of the lens so you can observe the position of the slider brush, Fig. 10. When you release the shutter, the slider brush stops at a position on the signal board that corresponds to the selected focus. Adjust the selectivity as follows:
   a. Place the bar target 1m from the film plane. The target should not have a highly reflective or matte-black surface. Allow some separation between the bar target and the wall. You can then test to see that the AF selects the small target area.
   b. Align the camera so that the bar target appears inside the AF

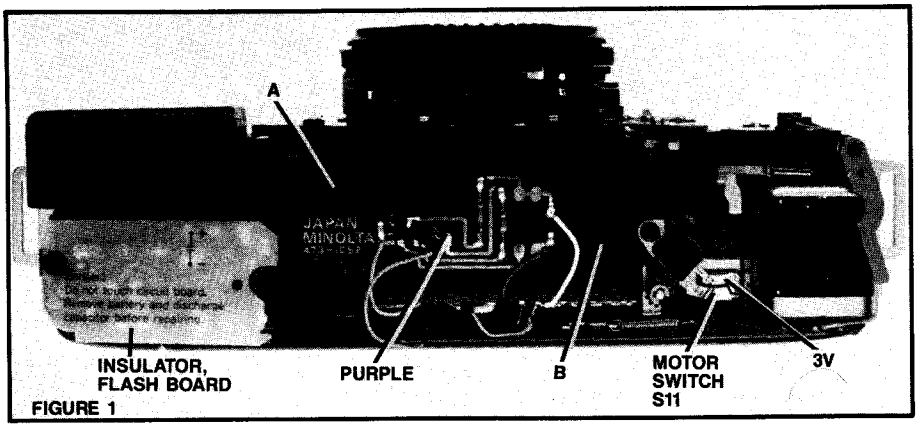


FIGURE 1

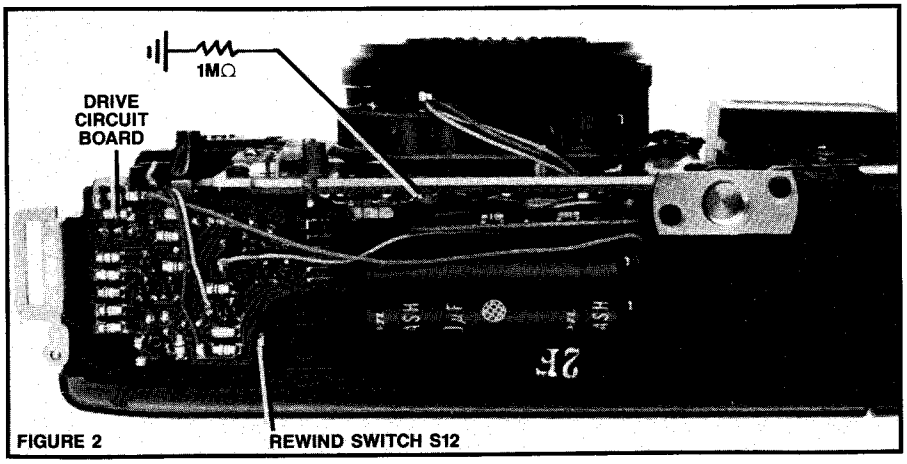


FIGURE 2

frame lines in the viewfinder. The bar target should be at one side—yet still located within—the AF frame lines.

c. Release the shutter. The slider brush should stop at position 1, Fig. 10. If the slider brush goes past position 1, the AF is focusing on the wall rather then on the bar target. Adjust by shifting the viewfinder mask horizontally (the adjustment behind adjustment A in Fig. 1).

4. Check the AF accuracy by observing the slider position after releasing the shutter at different target distances. If the slider doesn't stop at the proper position according to the target distance, adjust B in Fig. 1. The following chart shows the proper slider position according to the target distance:

TARGET DISTANCE	SLIDER POSITION
2.35m	5
2.1m	4
1.47m	3
1.27m	2
1.1m	1
0.9m	1

5. Check infinity by covering the AF windows as you release the shutter; use the test lead to hold open the blades. Check for sharp infinity focus with a collimator or a ground glass. Adjust by loosening the three screws, Fig. 9, and turning the front-lens cell.

EXPOSURE ADJUSTMENTS:

1. Test the auto exposure before replacing the shutter-block screws. Hold the shutter block firmly against the camera body. Apply 2.8V to the battery terminals. Check the auto exposure at EV 9, EV 11, and EV 15 (ASA 100). The exposures should be within 0.8 EV. If not, lift aside the shutter block and adjust the trigger switch (eccentric C, Fig. 7).
2. Check the flash aperture by first focusing on a target 2m from the film plane with the flash raised. Hold the focus setting by keeping the release partially depressed. Cover the CdS and the flashtube. Check the exposure at EV 10. The exposure should be within 1 EV. If not, bend the flash-aperture lever, Fig. 10, to change the flash aperture.

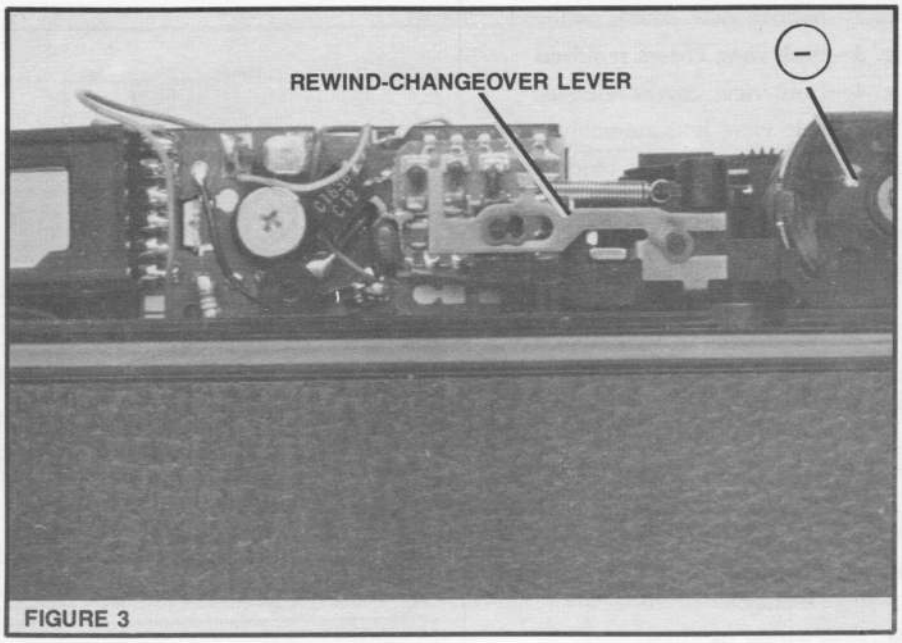


FIGURE 3

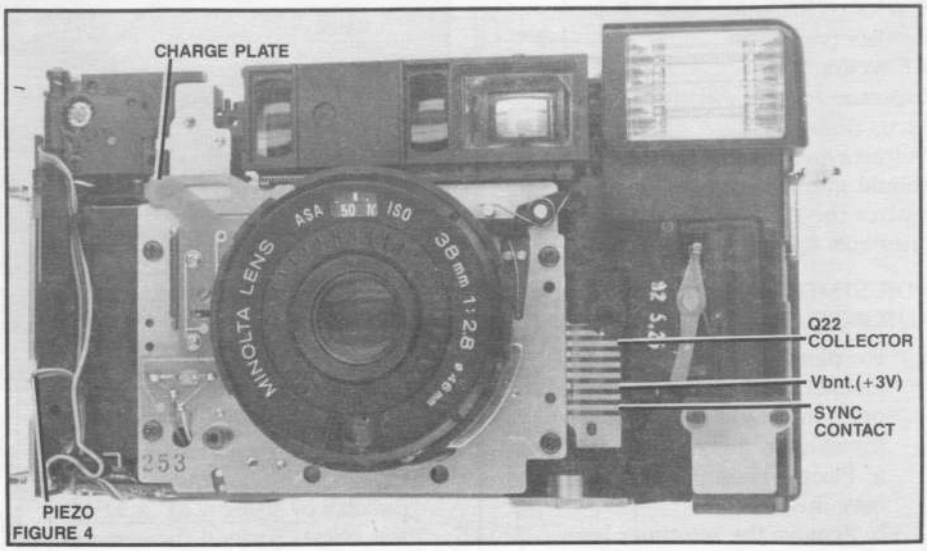


FIGURE 4

ADDITIONAL TEST PROCEDURES:

1. Low-light warning. Check at EV 7 (ASA 100); the low-light LED should turn on. Check at EV 10; the low-light LED should not turn on.
2. Flash-ready signal. The neon ready lamp should turn on when the main capacitor reaches 262 + or − 10V.
3. Low-voltage lock. The shutter should not release with an applied voltage of 2.3V or lower.
4. DC/DC converter. With S1 closed, the DC/DC converter (voltage-compensating circuit) steps up the battery voltage to around 3.5V for the AF circuit. You can check the circuit with the shutter block removed, Fig. 6. Apply 1.5V between the input leads marked plus and minus in Fig. 6. Measure the output between the negative input lead and the terminal marked "measure." Short the terminal marked "TP" to the negative input terminal. You should now measure the stepped-up voltage (3.3-4V). If not, replace the com-

plete main circuit board.

5. Shutter block. To check the shutter circuit with the shutter block removed, solder a wire to the S1 blade contact, Fig. 7. Connect 2.8V between the wire (positive) and ground (shutter-base plate). Cock the shutter by pushing the charge plate, Fig. 4, from right to left. When you push the release, the shutter should time out.
6. IC 101. Check by connecting power to the shutter block (item #5). Push the release until the S1 contact moves from the "a" pin to the "b" pin. You can then measure the IC pin voltages, Fig. 12.

OPERATION AND TESTS:

1. Push the release button part way to preview the focus and the exposure. Without batteries, or with low batteries, the shutter won't release when you fully depress the release button. When you let up the release button after the exposure, the motor runs to advance the film. The motor shuts off when the shutter is cocked.
2. The exposure-control circuit measures the light with the release partially depressed. If the light is too low for a hand-held shot, the low-light LED in the finder turns on and the piezo beeper emits a steady tone.
3. The autofocus circuit memorizes the focus distance to the portion of the subject located within the AF frame lines. The distance setting remains in memory as long as you hold the release button partially depressed. To change the focus setting, let up and then redepress the release button.
4. If the AF can focus on the selected subject, one of two AF LED's turns on in the finder. A subject distance of 1m to 2.1m causes the LED beside the head-and-shoulders symbol (close-up) to turn on. A subject distance of 2.1m to infinity causes the mountain-symbol LED to turn on.
5. If the AF can't focus on the subject, one of the AF LED's flickers and the piezo emits a beeping tone. The subject may then be within the minimum focusing distance (closer than 1m). Or the subject may not be reflecting sufficient light to the infrared detector.
6. The ST LED at the front of the camera turns on briefly as the shutter releases. On the self-timer function, the ST LED glows steadily during the first part of the delay. The ST LED flickers during the last portion of the delay, and the piezo beeps.
7. The motor has a 4-second timer. If the motor switch remains on (such as at the end of the roll when the shutter can't cock fully), the motor continues to run for 4 seconds and then shuts off.
8. The flash switch closes when you push the flash-lock lever to raise the flash. The shutter won't release until the flash charges. With the flash raised, the shutter speed goes no slower then 1/40. The f/stop depends on the ASA setting and the focus distance.

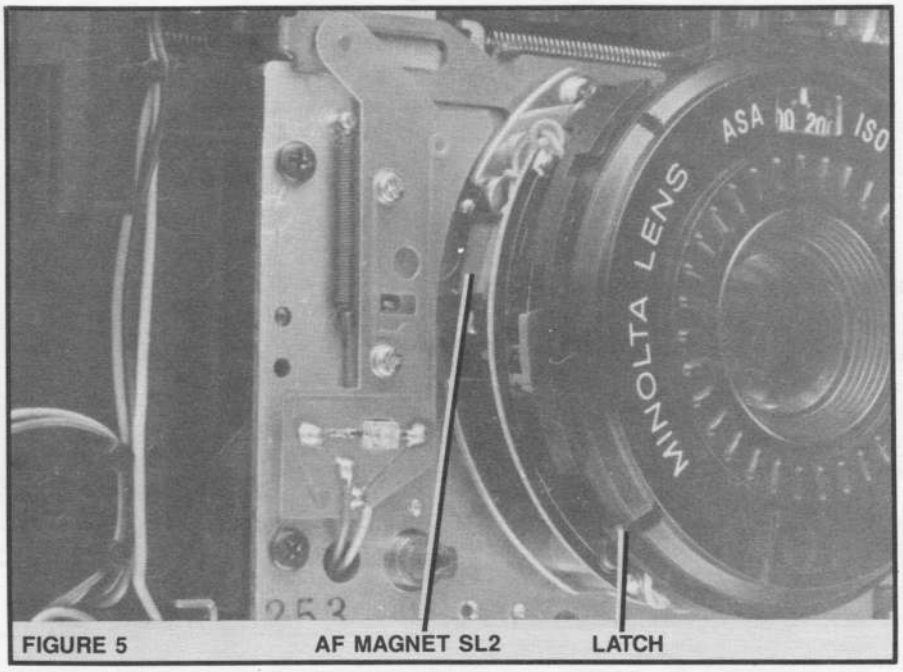


FIGURE 5

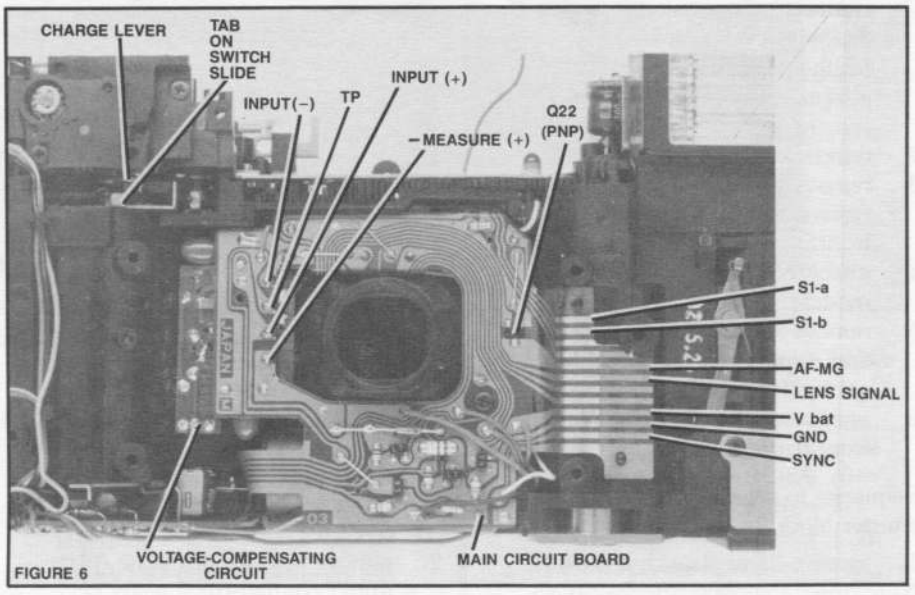


FIGURE 6

9. The piezo provides a warning if the flash distance is excessive. Check by focusing on a 4m target. At ASA settings of 100-400 (flash raised), the mountain symbol LED should turn on steadily when you push the release button part way. At ASA settings of 25-80, the mountain symbol should flicker and the piezo should beep. With a target at infinity, the mountain LED should always flicker (flash raised) and the piezo should always beep.

DISASSEMBLY HIGHLIGHTS:

Precautions: After removing the top cover, discharge the flash capacitor between the two terminals of the flash-circuit board (indicated on the insulator, Fig. 1). Use a discharging resistor (100 ohm, 1 watt).

Sequence:

1. remove front cover
   a. remove neckstrap
   b. remove leather at release-button end of camera and screw under leather
   c. remove 2 screws inside film chamber
   d. remove self-timer lever (leather disc and screw)
   e. remove 3 screws, bottom of camera
2. remove top cover (3 screws)
3. remove counter assembly (2 screws, one at top and one at front)
4. unsolder purple wire, top of AF module
5. remove AF module (3 screws and unplug module from connector, Fig. 8)
6. remove shutter block (4 screws, front corners)

Sequence to remove rings at front of shutter block:

1. remove nameplate ring

Note: the nameplate ring has a bayonet mount. Working through the slot at 7 o'clock, Fig. 5, depress the latch. Then rotate the nameplate ring a partial turn in a counterclockwise direction.

2. lift out film-speed ring (ball detent and compression spring loose)
3. unsolder blue wire from ASA switch
4. remove screw holding ASA switch ground contact
5. remove screws and front ring assembly (diffusion disc over CdS loose, Fig. 10)

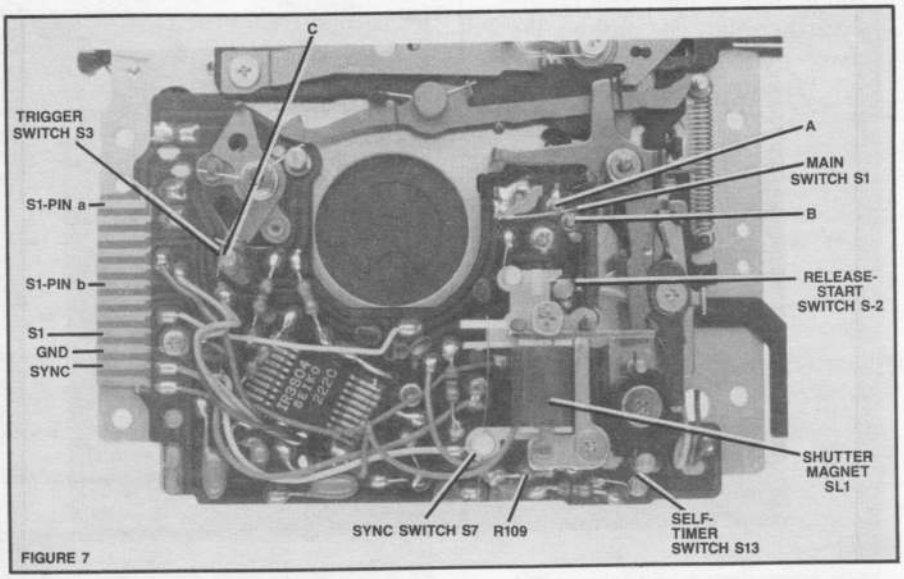


FIGURE 7

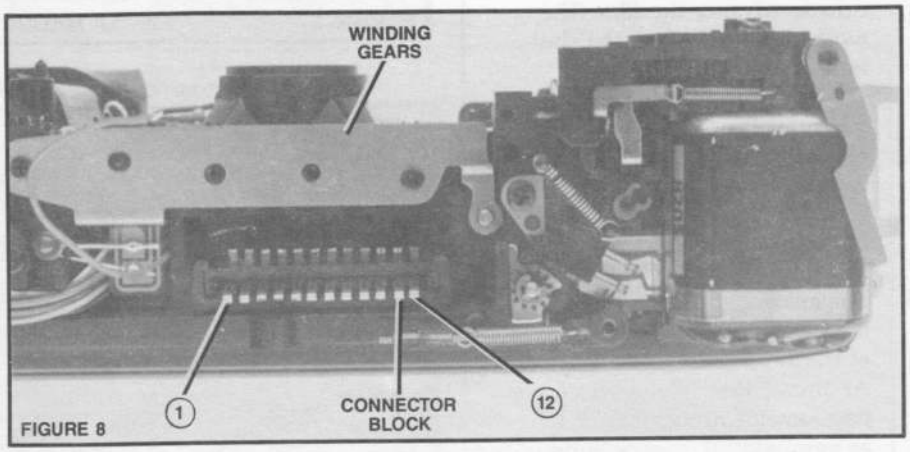


FIGURE 8

Sequence to remove motor:

1. remove counter-drive gear (E-clip)
2. remove rewind-lock plate (plate under counter-drive gear)
3 remove rewind-changeover lever, Fig. 3 (spring, 2 snap rings)
4. unsolder 3 wires from motor-switch P.C. board (red, orange, black)
5. remove motor assembly (2 screws)

Note: Before replacing the motor assembly, turn the wind gears until the slot in the metal stop gear faces the stop levers. Then, as you seat the motor assembly, fit the end of the plastic stop lever to the right of the winder-switch tab (the tab at the bottom of the motor assembly, Fig. 6).

Reassembly highlights:

1. If you disassemble the gear train, Fig. 8, note that three gears have punch marks for timing—the charge gear, the metal stop gear, and the sprocket gear. Align the punch mark on top of the metal-gear ridge with the punch mark on the charge gear (the gear with the plastic cam). Align the punch mark on the sprocket gear with the second punch mark on the metal stop gear (the punch mark next to the gear teeth).
2. Install the shutter in the released position. To release the shutter, hold the SL1 armature as you

push the release slide. As you seat the shutter block, fit the tab on the charge plate, Fig. 4, between the roller on the charge lever and the tab on the switch slide, Fig. 6. First hold aside the charge lever so the roller fits to the outside of the charge-plate tab; then push the switch slide to the right, Fig. 6, until its tab fits to the inside of the charge-plate tab. The shutter block should then seat properly.

3. Before seating the counter assembly, turn the gear at the bottom until the slot in the orange counter-advance gear faces away from the counter dial teeth.
4. Before replacing the front cover, make sure the flash-on switch is in the off position. If necessary, disengage the latch at the back of the front cover from the flash-on switch; the switch then moves to the off position.

TROUBLESHOOTING:

Behavior without batteries: shutter won't release

Current draw (3V supplied):

-release depressed, piezo on—52ma (not over 80ma)

-release depressed, piezo off—35ma

-motor running, no film—420ma

-motor running with film—450ma (not over 800ma)

-self-timer—42ma (not over 85ma)

Frequently repaired sections:

1. Rewind shaft broken. The old-style rewind shaft has straight sides on the fork that engages the film cassette. The revised rewind shaft has slanted sides. To replace, lift aside the flash-circuit board (one screw, unsolder negative-battery contact and two flash-switch contacts, Fig. 11). New-style rewind shaft—0473-3101-03.
2. Damage to levers at top of shutter block when user tries to force release button with low batteries in camera.

Troubleshooting steps for specific problems:

1. Shutter won't release (release locked)

   Solder bridge, main switch S1

   Check by removing and then replacing the batteries. If the shutter will release after you replace the batteries—but then fails to release a second time—remove the shutter block. Check for a solder bridge between the S1 contact and the b pin, Fig. 7.

   Main switch S1, poor contact to b pin

   Check the voltage between pin 11 of the connector block, Fig. 8, and ground (pin 6 of the connector block or the shutter-base plate). When you push the release part way, you should measure the supply voltage. If not, clean the main-switch contacts and the flex connectors on the main circuit board and shutter block, Fig. 6 and 7.

   Battery voltage to connector block

   Check the voltage at pin 5 of the connector block, Fig. 8 and Fig. 13, with the release partially depressed. You should measure over 3V (output of DC/DC converter). If not, check the red-wire solder connections, Fig. 14, and the voltage-compensating circuit (see "Additional Test Procedures," #4).

   Shutter block

   Remove shutter block and check separately (see "Additional Test Procedures," #5).

   If the shutter block works properly, check for poor contact between the shutter block and the main circuit board.

   Shutter magnet, open or out of

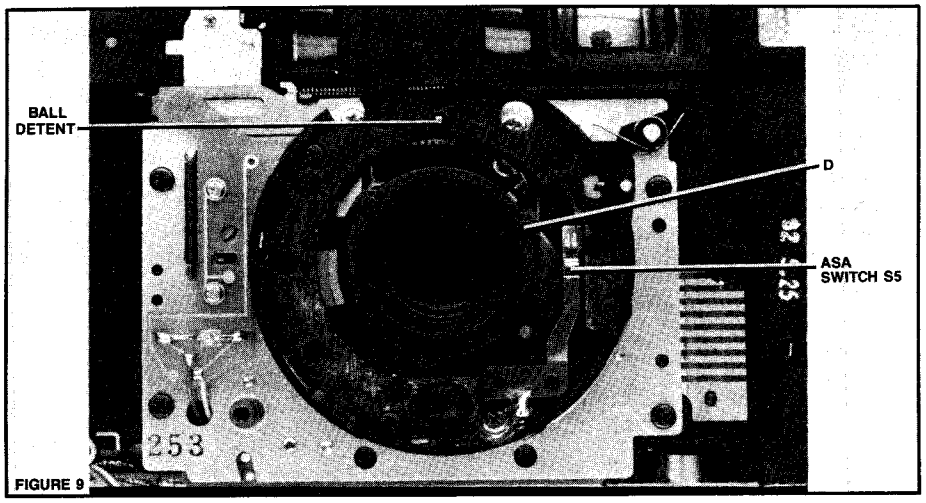


FIGURE 9

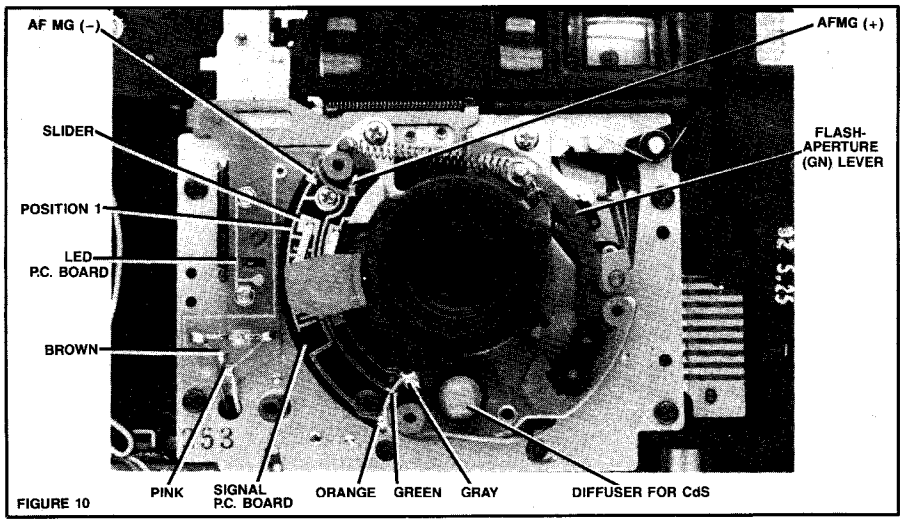


FIGURE 10

adjustment

Check the coil resistance between the two red wires, Fig. 7. Approximate resistance—200 ohms. Also check the magnet adjustment. If the magnet sits too low, its core may not make adquate contact with the armature. Loosen the magnet screw and shift the shutter magnet closer to the armature.

IC 101

Check the IC pin voltages, Fig. 12, by applying power to the shutter block and pushing the release part way. Check pin 7, pin 3, pin 18, pin 13, pin 11, and pin 1. Improper voltages may indicate poor solder to the pins or a defective IC.

Poor ground to shutter

Check for a loose ground screw on the shutter board, Fig. 7.

Trigger switch

Check for poor contact to the trigger switch, Fig. 7.

2. Shutter does not open, but lens moves to focus position when you push release

Connector block

Check for poor contact between the AF module and pin 10 of the connector block, Fig. 8 (if the lens always stops at the first position).

IC 101

Check for poor solder to pins 13, 9, 11, and 5, Fig. 12.

3. Lens always stops at first position (position 1)

Poor contact between shutter block and main circuit board

Check the voltage to the terminal on the main circuit board marked "Q22 collector," Fig. 4. With the AF windows covered, you should measure around 3V when you depress the release part way (OV at a close-distance position—a 0V reading means the lens will stop at position 1). You should read the same voltage at the positive AF-magnet lead, Fig. 10. If you get the proper reading at the main circuit board, Fig. 4, but not at the AF magnet, Fig. 10, check for poor contact between the main circuit board and the shutter board. If you don't get the proper reading at the main circuit board, Q22 may be open.

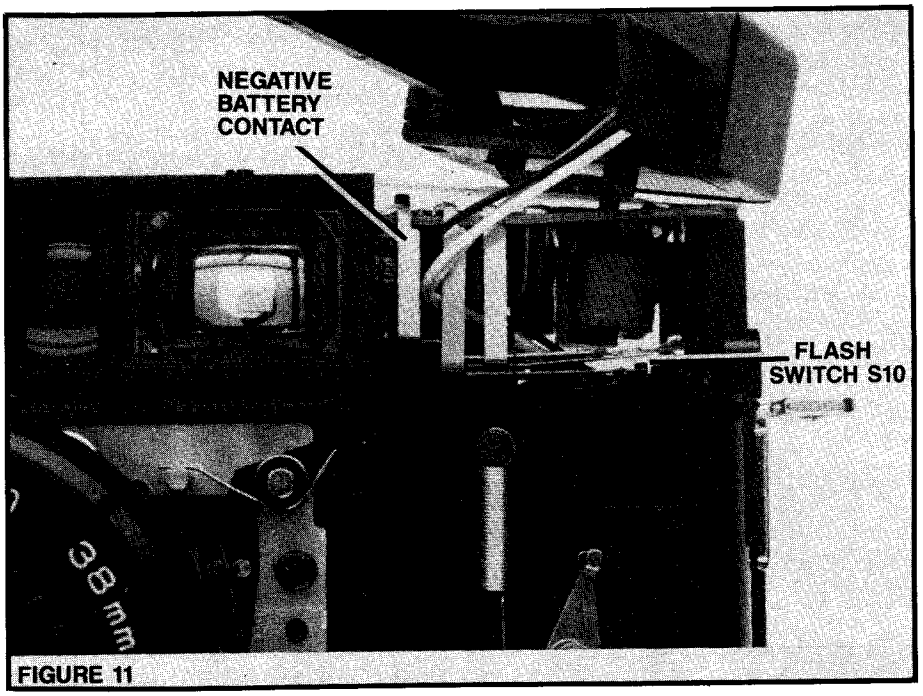


FIGURE 11

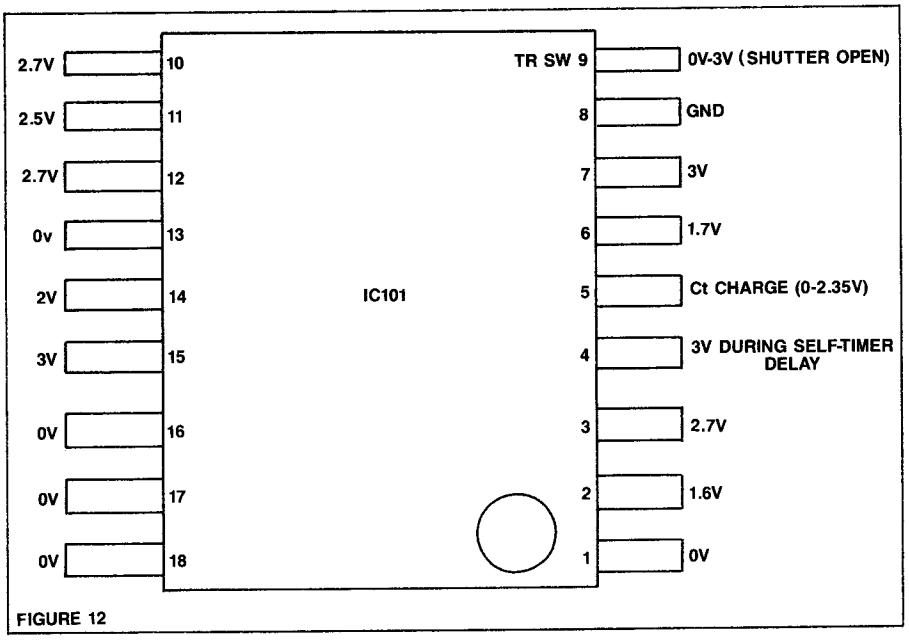


FIGURE 12

AF magnet, open

Check the coil between the two red wires, Fig. 10, to the AF magnet. You should measure around 280 ohms.

Connector block

Check for poor contact between pin 10 of the connector block, Fig. 8, and the AF module. If the AF LED won't turn on in the finder, check for poor contact between pin 6 and the AF module.

AF module

Check the voltage at pin 10 of the connector block with the AF module installed. The voltage depends on the subject distance (around 3V at 1m, around 2.4V

at 7m).

Improper voltage readings indicate a defective AF module.

4. Lens always moves to infinity position (position 7)

Connector block

Check the contact between pin 5 of the connector block and the AF module. With poor contact at pin 5, Fig 8, the AF LED won't turn on in the finder and the lens always moves to position 7.

AF module

Check the voltage at pin 10, Fig. 8, of the connector block (AF module installed).

If the AF module is o.k., the voltage at pin 10 changes according to the subject distance (around 3V at 1m).

Transistor Q22, Fig. 6—shorted

Check for an emitter-to-collector short.

Poor contact, main circuit board to shutter board

Check for poor contact between the terminal on the main circuit board marked "lens signal," Fig. 6, and the corresponding contact on the shutter board, Fig. 7.

Main circuit board, defective

5. Lens stops at first or last positions (1 or 7), but selects nothing in between

Connector block

Check for poor contact between pin 9, Fig. 8, and the AF module.

6. Motor does not operate

Voltage to drive circuit board

Check for 3V at the red wires, drive circuit board, Fig. 14. No voltage—red wire between drive circuit board and flash-circuit board, poor solder.

Voltage to motor-switch board

Check for 3V to the land marked "3V" in Fig. 1. No voltage—red wire between drive circuit board and motor-switch board, poor solder.

Motor switch, poor contact

With the motor switch in the on position, Fig. 8, you should measure direct contact between the red wire and the orange wire at the front edge of the drive circuit board, Fig. 14. No contact—motor switch S11 defective.

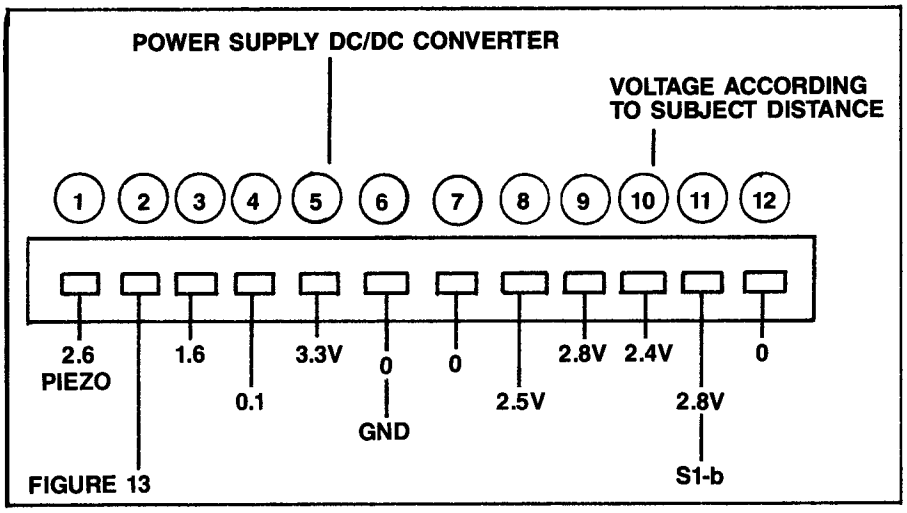


FIGURE 13

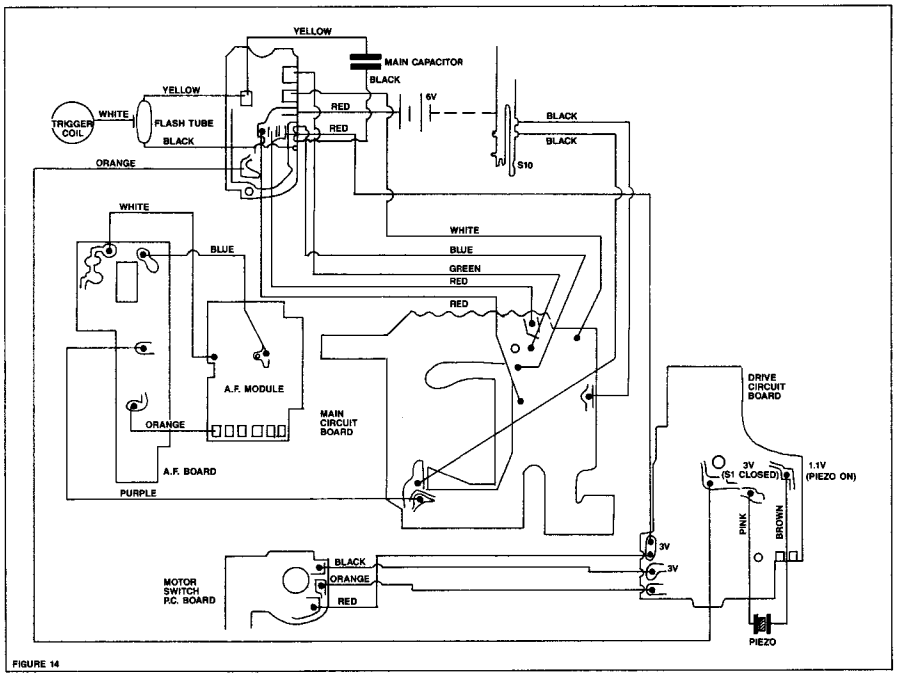


FIGURE 14

Motor defective

Check by applying around 2V to the motor terminals, Fig. 3. If the motor does not run, replace the motor assembly.

Drive circuit board, defective

7. 4-second timer inoperative

Drive circuit board, defective

8. Rewind stops after 4 seconds

Poor contact, rewind switch S12, Fig. 2

9. Flash does not fire

Sync contacts, shutter block, Fig. 4

Check by raising the flash. Then short the sync terminal of the main circuit board, Fig. 4, to the shutter base plate. If the flash then fires, the problem is poor contact in the sync switch. If the flash still will not fire, the problem is in the flash-circuit board (trigger coil, trigger capacitor, or flashtube).

10. Flash does not charge

Flash switch, Fig. 11, poor contact

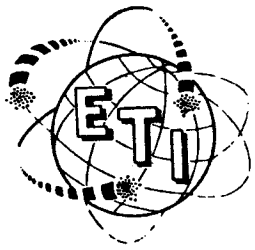
Flash-circuit board, defective (power transistor)

OTHER COMMENTS:

1. Transistor Q22 is a PNP transistor that connects to the AF magnet. If Q22 is open, no current flows through the AF magnet; the lens always stops at

position 1. If Q22 is shorted, current continues flowing through the AF magnet; the lens always moves to position 7.

2. Product number for parts orders—0473.
3. Flash parts—
   -flash P.C. board—0411
   -flashtube—0461-4452
   -main capacitor—0461-4451
4. Other parts—
   -motor—0473-3020
   -front cover—0140-01
   -shutter magnet SL1—0473-0780
   -battery cover—0473-0170
   -rewind shaft—3101-03
   -AF magnet SL2—0462-0212
   -shutter P.C. board—0702



ARE YOU AWARE OF THE INCREDIBLE DEMAND FOR AND HIGH SALARIES BEING PAID TO

VIDEO TECHNICIANS?

WE ARE!
Electronic Technical Institute
(Video Division)
4765 Oakland Street
For Hands-On Training Call 371-3060
Day and Evening Classes

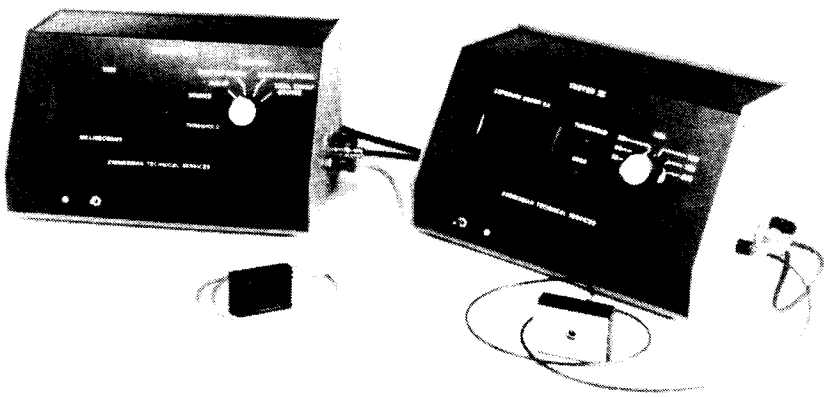
★Associate Degree Program

★Employment and Financial Aid Assistance Available

MEETING TESTING REQUIREMENTS FOR OVER 5 YEARS!

ZTS

TESTERS II & III



- Test and adjust new program SLRs.
- Test shutter speeds to 1/4000 second.
- Exposure error through a 9 f-stop range, curtain travel time, shutter speed, and auxiliary functions.

Send for a free copy of operating instructions and prices.

Zimmerman Technical Services
1848 Heidelberg Drive
Loveland, OH 45140
(513) 683-7353